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Control of Volunteer Potato (*Solanum tuberosum*) in Sweet Corn with Mesotrione Is Unaffected by Atrazine and Tillage

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Volunteer potato is a major weed pest of sweet corn in regions where winter soil temperatures fail to kill tubers left in the ground after harvest. Studies were conducted in 2004 to 2005 to determine the effect of combining atrazine with mesotrione applied POST on volunteer potato control and new tuber production in sweet corn. Mesotrione at 0.035, 0.07, and 0.1 kg/ha and atrazine at 0.3, 0.6, and 1.1 kg/ha were applied alone and in all possible combinations when volunteer potato ranged from 5 to 12 cm tall. Mesotrione applied alone at all rates, atrazine at 1.1 kg/ha, or mesotrione plus atrazine combinations reduced the number of new tubers produced to $\leq$ 1.1 per plant compared with 11 tubers per plant in nontreated checks. Potatoes treated with atrazine alone at 0.3 or 0.6 kg/ha produced 3.3 or 1.9 tubers per plant, respectively, which could lead to volunteer potato problems in the succeeding crop. Sweet corn yield was not affected by herbicide treatment in 2004 but was reduced in 2005 when atrazine was used alone at 0.3 or 0.6 kg/ha because of poor control of volunteer potato. Additional studies were conducted from 2004 to 2006 to determine volunteer potato control in sweet corn in reduced and conventional tillage and treated with fluroxypyr, mesotrione, or no herbicide. Volunteer potato control was improved and the number and weight of tubers was reduced 79 and 91%, respectively, in conventionally tilled plots treated with fluroxypyr compared with reduced-tillage plots. Control of volunteer potato with mesotrione was greater than 98% and reduced tuber number and weight greater than or equal to all other treatments regardless of tillage level.

Nomenclature: Atrazine; fluroxypyr; mesotrione; potato, *Solanum tuberosum* L., sweet corn, *Zea mays* L.
Key words: Cultivation, groundkeepers, herbicides, tillage level, weed management.

Volunteer potato is a recurring weed problem in regions where winter soil temperatures fail to drop below the -1.5 C threshold necessary to kill tubers remaining in the soil after potato harvest (Boydston et al. 2006). Several herbicides suppress volunteer potatoes when applied POST, but plants are seldom killed (Boydston 2001, 2004). Surviving plants often continue to produce small tubers leading to volunteer potato problems for several subsequent years even though top growth in the first rotational crop is severely restricted by the herbicide.

Volunteer potato control in field corn and sweet corn has improved substantially in recent years with the use of mesotrione applied POST (Boydston and Williams 2005). Mesotrione is an inhibitor of 4-hydroxyphenylpyruvate dioxygenase (HPPD), an enzyme involved in carotenoid biosynthesis. Mesotrione is often used in combination with atrazine in corn to broaden the spectrum of weeds controlled and improve the control of annual broadleaf weeds, such as velvetleaf (*Abutilon theophrasti* Medik.), Palmer amaranth (*Amaranthus palmeri* S. Wats.), ivyleaf morningglory, (*Ipomoea hederacea* Jacq.), and tall waterhemp [*Amaranthus tuberculatus* (Moq.) Sauer] (Abendroth et al. 2006; Hugie et al. 2004; Johnson et al. 2002). Atrazine applied with mesotrione also improved the control of Canada thistle [*Cirsium arvense* (L.) Scop.] compared with mesotrione alone (Armel et al. 2005). Atrazine applied PRE or POST suppresses volunteer potato (Boydston 2001), and applying atrazine and mesotrione together may improve volunteer potato control or allow for reduced herbicide rates.

Mesotrione can persist in soils and injure subsequent crops. There is an 18-mo plant-back restriction to sugar beets (*Beta vulgaris* L.), peas (*Pisum sativum* L.), beans (*Phaseolus vulgaris* L.), and curcurbits species on the mesotrione label. Fluroxypyr applied POST also suppresses volunteer potato in sweet corn and is sometimes preferred over mesotrione because of the shorter plant-back restriction of only 120 d to sensitive crops.

Reduced tillage systems are increasingly being used due to benefits of decreased soil erosion and increased profitability. Boydston (2001) reported greater midseason control of volunteer potato in conventionally tilled corn, compared with no-till corn, but mesotrione was not included in those studies. Fluroxypyr plus a simulated cultivation 10 d after treatment reduced potato tuber number and weight much more than the herbicide alone when potatoes were grown in monoculture (Boydston 2001).

These studies were conducted (1) to determine whether the addition of atrazine improved volunteer potato control in sweet corn with mesotrione and (2) to determine the efficacy of mesotrione and fluroxypyr on volunteer potato in sweet corn grown under reduced-tillage and conventional-tillage systems.

Materials and Methods

All studies were conducted at the USDA-ARS research farm near Paterson, WA. Sweet corn was grown each year under center pivot irrigation on a Quincy (Mixed, mesic Xeric Torripsamments) sand containing 0.4% O.M., pH 6.8. Sweet corn was planted to obtain a final density of 83,000

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plants/ha in rows spaced 76 cm apart. Dimethenamid-P was applied PRE at 0.7 kg/ha in 2004 and 2006, and dimethenamid-P at 0.7 kg/ha plus pendimethalin at 1.1 kg/ha were applied PRE in 2005 to control annual weeds. Dimethenamid-P and pendimethalin are labeled for use on potato and do not negatively affect potato growth. Studies were kept free of additional weeds by hand-weeding. Herbicides were applied with a bicycle sprayer equipped with six, 8002 flat-fan nozzles and operated at pressure of 186 kPa in a total spray volume of 187 L/ha.

Mesotrione and Atrazine. A study was conducted in 2004 and 2005 in sweet corn following potato. Sweet corn variety 'Seneca 1861' was planted April 7, 2004, and 'Sheeba' was planted April 13, 2005. In 2004, a natural population of volunteer potato averaging 2,700 plants/ha were present in the study. In 2005, following a colder winter, six whole-seed potato tubers, averaging 70 g each, were planted by hand at a spacing of 1.5 m between the two center corn rows of each plot on April 5 to guarantee a potato population. However, a natural population of volunteer potato emerged in 2005 providing a total of 3,100 plants/ha.

Individual plots contained four rows of sweet corn and measured 3 by 12 m. Herbicides were applied May 3, 2004, and May 11, 2005, when volunteer potatoes were 5 to 13 cm tall and sweet corn was in the three- to four-leaf stage. Potatoes were beginning to initiate tubers at the time of the POST herbicide application, with some plants having 4-mm-diam tubers. Atrazine was applied at 0.3, 0.6, and 1.1 kg/ha and mesotrione at 0.035, 0.07, and 0.1 kg/ha in a factorial arrangement replicated four times in a randomized complete-block design. Hand-weeded controls and nontreated controls were included for comparison. Emerged potato shoots were removed weekly in hand-weeded controls for 5 wk after corn planting and as needed the remainder of the season. All herbicide treatments included a crop oil concentrate (COC)[1] at 1% v/v and UAN32 fertilizer solution[2] at 2.5% v/v.

Volunteer potato control was visually rated on a scale from 0 (no control) to 100 (complete control) in early June in both years. Corn injury was rated visually on a scale from 0 (no injury) to 100 (complete death) at 1, 2, and 6 wk after treatment (WAT) each year. At the time of POST herbicide application, six potato plants were flagged in each plot and potato tubers were harvested, counted, and weighed from these plants following potato senescence each year. Sweet corn was harvested at 72% kernel moisture July 20, 2004, and at 74% kernel moisture July 20, 2005. Sweet corn ears greater than 18 cm were hand-harvested from 6.1 m of the two center rows in each plot and counted and weighed.

Tillage. A second study was conducted in 2004, 2005, and 2006. Sweet corn variety Seneca 1861 was planted April 7, 2004, Sheeba was planted April 10, 2005, and 'Honey Select' was planted April 24, 2006. Twenty whole-seed tuber variety 'Ranger Russet', averaging 70 g each, were hand-planted at 0.5-m spacing in two rows at 13 cm from each of the two center rows of sweet corn in each plot April 8, 2004, April 11, 2005, and March 31, 2006. In 2004, sweet corn followed a previous crop of winter wheat (*Triticum aestivum* L.), and in 2005 and 2006, sweet corn followed a previous crop of sweet corn. Conventionally tilled (CT) sweet corn was disked, ripped (41-cm shanks spaced 43 cm apart), and packed before corn planting, and potato shoots were hoed off 5 cm deep by hand to simulate a cultivation of 7 to 10 d following POST herbicide applications. Reduced-tilled (RT) sweet corn was planted directly into wheat or corn residues without any preplant tillage, and no further tillage or cultivation was performed. Glyphosate at 1.1 kg ae/ha was included with PRE herbicides to control emerged winter annual weeds in RT plots.

Plots contained four rows of sweet corn and measured 3 by 7 m. Mesotrione at 0.1 kg/ha and fluroxypyr at 0.28 kg/ha were applied May 17, 2004, May 18, 2005, and May 15, 2006, when volunteer potatoes were 15 to 20 cm tall and sweet corn had 5, 4.5, and 3 collars, respectively. Potato tuber initiation had just begun at the time of the POST herbicide application date each year, with some plants having 4-mm-diam tubers. Mesotrione treatments included a COC at 1% v/v and UAN32[2] fertilizer solution at 2.5% v/v and fluroxypyr treatments included a nonionic surfactant at 0.25% v/v. Treatments were replicated eight times in a randomized complete-block design. A nontreated control was included for comparison.

Corn injury and volunteer potato control were rated visually on a scale from 0 (no injury) to 100 (complete death) at the time of cultivation (1 WAT) and at 3 WAT in each year. At the time of POST herbicide applications, potato plants were flagged in each plot, and potato tubers were dug from these plants in July of each year after potato plants had senesced. The number and weight of tubers from 10 plants were determined, and tubers were maintained at 3 C at 70% relative humidity for 6 mo. After 6 mo, potato tubers were removed from cold storage and placed at 20 C for 8 wk in paper bags to monitor tuber sprouting. Sprouted tubers were recorded for 8 wk. Tubers were considered sprouted and were discarded once they contained either one sprout greater than 25 mm or two sprouts greater than 10 mm. Sweet corn was harvested at 72 to 74% kernel moisture each year. Sweet corn ears greater than 18 cm were hand harvested from 4.6 m of the two center rows in each plot and counted and weighed to determine total marketable yield.

Statistical Analysis. All data were subjected to ANOVA. Tuber number and weight data were square root–transformed to satisfy assumptions of normality and homogeneity of variances before analysis. For these data, statistical conclusions were derived from transformed data, and back-transformed means are reported. When a significant year by treatment interaction existed, data were analyzed separately by year. Treatment means were separated by Fisher's Protected LSD procedure at $P \leq 0.05$.

Results and Discussion

Mesotrione and Atrazine. There was a significant year by treatment interaction for corn injury, so data from each year were analyzed separately. Sweet corn injury following herbicide treatments was greatest at 1 WAT, averaging 10% and decreased to 3% or less at 6 WAT in both years (data not

Table 1. Sweet corn injury at 2 wk after treatment (WAT) and ear yield following atrazine and mesotrione combinations in 2004 and 2005 near Paterson, WA.

Herbicide[a]	Rate	Sweet corn injury (2 WAT)[b]		Sweet corn ear yield[b]	
		2004	2005	2004	2005
	kg/ha	%		MT/ha	
Atrazine	0	2 b	4 b	26.7 a	16.4 a
	0.3	2 b	7 a	26.6 a	16.6 a
	0.6	3 ab	7 a	27.6 a	18.1 a
	1.1	4 a	9 a	28.1 a	18.3 a
Mesotrione	0	0 c	4 c	27.8 a	13.7 b
	0.035	0 c	5 c	27.2 a	17.3 a
	0.07	3 b	7 b	28.7 a	18.8 a
	0.1	8 a	10 a	25.6 a	19.3 a

[a] All treatments included crop oil concentrate at 1% v/v and a liquid urea–ammonium–nitrate fertilizer solution (UAN32) at 2.5% v/v.

[b] Means (injury and yield) are averaged over both herbicides, and means within a herbicide and column followed by the same letter are not significantly different according to Fisher's Protected LSD at a $P \leq 0.05$ level.

shown). Sweet corn injury data at 2 WAT are presented to demonstrate the general responses observed each year (Table 1). There was no significant atrazine by mesotrione interaction on sweet corn injury, and data for each herbicide are averaged over rates of the other herbicide (Table 1). Sweet corn injury increased slightly with increasing mesotrione and atrazine rates, but overall injury was minor and transient (Table 1). Sweet corn injury at 2 WAT was slightly greater in 2005, ranging from 4 to 10%, compared with 0 to 8% in 2004, this may be due to differences in hybrid sensitivity to the herbicides or differences in weather between the 2 yr (Table 1). Several researchers have reported differences among sweet corn hybrids sensitivity to mesotrione (O'Sullivan et al 2002, Williams et al 2005).

Sweet corn yield was not affected by atrazine, and the effects of mesotrione differed between years. In 2004, sweet corn yield was not influenced by mesotrione rate and averaged 27.3 MT/ha (Table 1). However, in 2005, sweet corn yield was significantly higher when mesotrione was applied (average 18.5 MT/ha) compared with plots that were not treated with mesotrione (13.7 MT/ha) (Table 1). The different sweet corn varieties planted each year may have contributed to the difference in yield response between years. Sheeba sweet corn, planted in 2005, is a relatively short variety compared with Seneca 1861, planted in 2004, and may have been less competitive with poorly controlled volunteer potatoes when no mesotrione was applied. In a previous study, a short, less-competitive sweet corn hybrid required more weed suppression by herbicides to maintain yield than a taller hybrid with greater competitive ability (Williams et al. 2007). A slightly greater volunteer potato population in 2005 than in 2004 may also have contributed to differences in sweet corn yield responses between years, resulting in a positive yield response to mesotrione use.

Year, atrazine, and mesotrione all significantly affected volunteer potato control at 4 WAT (Table 2). There were significant atrazine by mesotrione and year by atrazine by mesotrione interactions on volunteer potato control, so data are presented separately for each year–atrazine–mesotrione treatment combination. In both years, when atrazine was applied alone, volunteer potato control at 4 WAT increased as atrazine rate increased from 0.3 to 1.1 kg/ha (Table 2). Adding atrazine to mesotrione did not increase volunteer potato control, even in 2004 at the lowest mesotrione rate of 0.035 kg/ha, which only controlled potato 86% without atrazine (Table 2). Mesotrione applications of 0.07 and 0.1 kg/ha consistently controlled potato 93 to 100% at 4 WAT, regardless of atrazine rate (Table 2).

There was not a significant year or year by herbicide effect on the number or weight of potato tubers produced, so the potato tuber data were combined over years (Table 2). Both atrazine and mesotrione significantly affected tuber number and weight, and there was a significant mesotrione by atrazine interaction. An average of 59 tubers, weighing 4,157 g, were produced per six plants when no atrazine or mesotrione were applied (Table 2). Tuber number and weight were reduced equally by all treatments containing mesotrione or by the highest rate of atrazine alone at 1.1 kg/ha (Table 2). These treatments reduced tuber production to less than one tuber per plant, which would reduce volunteer potato numbers the following season. Increasing atrazine rate from 0.3 to 1.1 kg/ha reduced tuber number and weight when no mesotrione was applied; however, including atrazine with mesotrione did not further reduce tuber number or weight compared with mesotrione alone (Table 2).

Tillage. Sweet corn was injured by both fluroxypyr and mesotrione at 1 WAT in all 3 yr (Table 3). Tillage had no effect on sweet corn injury. There was a significant year by herbicide interaction on sweet corn injury, indicating sweet corn hybrids may have differed in sensitivity to the herbicides, or climatic differences between years may have influenced the amount of injury observed. Fluroxypyr caused a slight bending of the stalks at the base of the plant, whereas mesotrione caused chlorosis. At 1 WAT, fluroxypyr injury to sweet corn ranged from 3% in 2004 to 16% in 2005, and mesotrione injury to sweet corn ranged from 13% in 2005 to 22% in 2004 (Table 3). Sweet corn injury was transient with both herbicides and ranged from 1 to 10% approximately 3 WAT and was not evident later in the season (data not shown).

There was a significant year by herbicide interaction for volunteer potato control at 1 WAT. In 2004, mesotrione controlled volunteer potatoes 94% compared with 87% with fluroxypyr 1 WAT (data not shown). In 2005, potatoes were

Table 2. Volunteer potato control 4 WAT with mesotrione and atrazine combinations in sweet corn in 2004 and 2005 near Paterson, WA.

		Potato control[b]		Potato tuber[c]	
Mesotrione rate[a]	Atrazine rate[a]	2004	2005	Number	Weight
kg/ha		%		No./6 plants	g/6 plants
0	0	0 k	0 k	59.1 a	4,157 a
	0.3	21 j	43 i	19.6 b	1,087 b
	0.6	61 gh	53 h	11.8 bc	333 bc
	1.1	70 fg	91 abc	1.8 d	18 c
0.035	0	86 bcd	97 a	5.8 cd	135 c
	0.3	83 cd	98 a	5.8 cd	64 c
	0.6	73 ef	98 a	3.5 d	31 c
	1.1	79 def	96 ab	2.3 d	6 c
0.07	0	95 ab	99 a	3.4 d	30 c
	0.3	96 ab	100 a	1.8 d	12 c
	0.6	94 ab	99 a	0.5 d	2 c
	1.1	95 ab	98 a	0.9 d	10 c
0.1	0	97 a	99 a	1.9 d	5 c
	0.3	98 a	98 a	4.8 d	23 c
	0.6	96 ab	98 a	2.5 d	8 c
	1.1	93 abc	99 a	1.0 d	5 c

[a] All treatments included crop oil concentrate at 1% (v/v) spray solution and a liquid urea–ammonium–nitrate fertilizer solution (UAN32) at 2.5% (v/v) spray solution.

[b] Means within a column followed by the same letter are not significantly different according to Fisher's Protected LSD at a P = 0.05 level.

[c] Means are averaged over 2004 and 2005, and means within a column followed by the same letter are not significantly different according to Fisher's Protected LSD at a P ≤ 0.05 level.

initially controlled 94% by fluroxypyr and 89% by mesotrione at 1 WAT (data not shown). The two herbicides controlled volunteer potatoes equally from 93 to 94% at 1 WAT in 2006. Early season control ratings were not affected by tillage level.

There were significant tillage, herbicide, and tillage by herbicide interactions on volunteer potato control at 3 WAT. However, there were no year or year by herbicide or tillage interactions on volunteer potato control 3 WAT, so data were combined over years (Table 4). A simulated cultivation (CT) at 1 WAT improved volunteer potato control at 3 WAT with fluroxypyr to 99% compared with RT plots treated with fluroxypyr, which averaged 89% control (Table 4). Volunteer potatoes were controlled 98% or greater with mesotrione regardless of tillage level (Table 4). The simulated cultivation controlled volunteer potatoes 97% at 3 WAT in CT control plots that did not receive an herbicide (Table 4). By late June, some additional volunteer potato shoots emerged in these plots but were predominantly shaded by the sweet corn (data not shown).

There was a significant tillage by herbicide interaction on sweet corn yield. CT plots that received a simulated cultivation yielded from 25.1 to 27.2 MT/ha and were not different between fluroxypyr and mesotrione (Table 3). Sweet corn in RT plots treated with fluroxypyr and mesotrione yielded 22.9 and 24.7 MT/ha, respectively. Yield of RT sweet corn not treated with an herbicide to control volunteer potatoes was only 13.5 MT/ha, illustrating the competitive ability of volunteer potatoes with sweet corn (Table 3). Sweet corn height was reduced 25 to 30% by volunteer potato competition in all 3 yr in RT no-herbicide control plots, compared with all other treatments (data not shown). Sweet

Table 3. Sweet corn injury at 1 wk after treatment (WAT) with fluroxypyr and mesotrione, averaged over tillage systems, in 2004, 2005, and 2006. Sweet corn yield and number of marketable ears produced in reduced (RT) and conventional (CT) tillage systems and treated with fluroxypyr and mesotrione averaged over 3 yr near Paterson, WA.

		Sweet corn injury[b]			Total yield[c,d]		Marketable ears	
Herbicide[a]	Rate	2004	2005	2006	RT	CT	RT	CT
	kg/ha	%			MT/ha		ears/ha	
None	—	—	—	—	13.5 c	27.2 a	51,650 c	85,000 a
Fluroxypyr	0.28	3 b	16 a	13 b	22.9 b	25.1 ab	77,500 b	81,800 ab
Mesotrione	0.1	22 a	13 b	18 a	24.7 b	27.2 a	81,800 ab	86,100 a

[a] Herbicides applied May 17, 2004, May 18, 2005, and May 15, 2006.

[b] Means (sweet corn injury) are averaged over tillage treatments. Means within a column followed by the same letter are not significantly different according to Fisher's Protected LSD at a P ≤ 0.05 level.

[c] Sweet corn ears over 18 cm long.

[d] Means (total yield and marketable ears) are averaged over 3 yr. Means followed by the same letter within and between tillage treatments are not significantly different according to Fisher's Protected LSD at a P ≤ 0.05 level.

Table 4. Volunteer potato control at 3 wk after treatment (WAT) and number and weight of volunteer potato tubers produced in sweet corn grown under reduced (RT) and conventional (CT) tillage and treated with fluroxypyr or mesotrione averaged over 3 yr near Paterson, WA.

		Potato control[b]		No. of tubers		Weight of tubers	
Herbicide[a]	Rate	RT	CT[c]	RT	CT	RT	CT
	kg/ha	%		No./10 plants[b]		No./10 plants[b]	
None	—	0 c	97 a	105 a	23 c	8,009 a	274 c
Fluroxypyr	0.28	89 b	99 a	38 b	8 d	886 b	82 c
Mesotrione	0.1	98 a	99 a	8 d	14 cd	145 c	76 c

[a] Herbicides were applied May 17, 2004, May 18, 2005, and May 15, 2006.

[b] Means presented are averaged over 3 yr. Means within a category (potato control, number of tubers, and weight of tubers) and among tillage treatments followed by the same letter are not significantly different according to Fisher's Protected LSD at a P = 0.05 level.

[c] Conventionally tilled (CT) plots received a simulated cultivation of volunteer potato at 7 to 10 d after herbicide treatments.

corn yield loss from volunteer potato competition in RT nontreated control plots was due to approximately 40% fewer marketable ears harvested compared with CT plots (Table 3).

There was a significant tillage by herbicide interaction on both the number and weight of potato tubers harvested. Where no herbicide was applied for volunteer potato control, 105 tubers weighing 8,009 g were produced on 10 plants in RT plots, whereas only 23 tubers weighing 274 g were produced in CT plots (Table 4). Although the simulated cultivation alone in CT plots prevented some production of daughter tubers, the number of tubers produced was adequate to lead to substantial volunteer potato problems in succeeding years. Only 8 to 14 tubers weighing 76 to 145 g were produced per 10 plants in plots treated with mesotrione, and tillage level did not affect the number or weight of tubers produced (Table 4). Potatoes produced 38 tubers per 10 plants in RT plots treated with fluroxypyr and only 8 tubers in CT plots treated with fluroxypyr (Table 4). These results support previous studies in which cultivation improved control of volunteer potato with POST applied fluroxypyr (Boydston 2001). In fact, a simulated cultivation with no herbicide (CT control) reduced the number and weight of potato tubers more than one application of fluroxypyr without cultivation (Table 4). However, the simulated cultivation used in these studies removed all potato plants, whereas in a normal field situation, cultivation would not remove volunteer potato shoots located in the sweet corn row. A single removal of potato shoots was much less effective at reducing the number of daughter tubers produced in a previous study (Williams and Boydston 2002) than reported here, but in those studies potatoes were grown without any crop competition or shading and, as a result, were able to recover to a greater extent than in the current study. Volunteer potato shoots that emerged in late June following cultivation in CT control plots were often less competitive because of shading from sweet corn.

Sprouting of tubers collected from plots and stored for 6 mo averaged 67, 37, and 64% for 2004, 2005, and 2006, respectively (Table 5). Tubers that failed to sprout were generally smaller in size and had desiccated or dry-rotted during storage. In the CT system, a simulated cultivation following fluroxypyr or mesotrione application reduced tuber sprouting compared with RT in 2004 and 2005 but not in 2006 (Table 5). When no herbicide was applied, CT reduced tuber sprouting only in 2005 (Table 5). This may have been due to a greater number of small tubers in 2005 from CT plots, tended to desiccate more readily in storage. In general, both fluroxypyr and mesotrione reduced the percentage of tubers that produced sprouts compared with nontreated controls, which ranged from 30 to 94%, but the effect was not consistent from year to year (Table 5). The effect of the herbicides on sprouting was likely due to a reduction in tuber size, making them more susceptible to desiccation during storage. Under field situations, overwintering tubers may be less subject to desiccation, depending on soil moisture during winter months. In these and previous studies, sprouts developing from daughter tubers collected from plants treated with fluroxypyr or mesotrione were often smaller and spindly compared with sprouts from tubers collected from nontreated plants (R. A. Boydston, unpublished data).

Table 5. Sprouting of daughter tubers after 6 mo in cold storage. Tubers were harvested from plants treated with fluroxypyr or mesotrione from either conventional (CT) or reduced (RT) tillage systems.

		Volunteer potato tuber sprouting[a,b]					
		2004		2005		2006	
Herbicide	Rate	RT	CT	RT	CT	RT	CT
	kg/ha	%					
None	—	94 a	80 a	79 a	30 bc	81 a	79 a
Fluroxypyr	0.28	80 a	42 bc	41 b	0 c	76 ab	52 ab
Mesotrione	0.1	77 ab	29 c	79 a	25 bc	41 b	52 ab

[a] Tubers were sprouted at 20 C in the dark over 8 wk.

[b] Means within year and among tillage treatments followed by the same letter are not significantly different according to Fisher's Protected LSD at a P ≤ 0.05 level.

Mesotrione alone at rates ranging from 0.035 kg/ha to 1 kg/ha controlled volunteer potatoes and greatly reduced the number of new tubers produced. The addition of atrazine or a simulated cultivation following mesotrione application did not improve control or further reduce tuber numbers or weight compared with mesotrione alone. Fluroxypyr is another option for control of volunteer potatoes, but control is not as effective as mesotrione; control with fluroxypyr was improved by a simulated cultivation 7 to 10 d after application. Both herbicides are important and effective tools for managing volunteer potatoes in sweet corn. A single simulated cultivation was also effective in controlling volunteer potatoes and maintaining sweet corn yields but, in practice, would not provide control of volunteer potatoes in the crop row or reduce tuber numbers in the soil.

Sources of Materials

[1] Mor-Act, a crop oil concentrate product of Wilbur-Ellis Co., P.O. Box 16458, Fresno, CA 93755.

[2] UAN32 is a urea–ammonium–nitrate fertilizer solution containing 32% nitrogen, J. R. Simplot, Boise, ID 83702.

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